CLAIMS

I claim:

1. An apparatus for monitoring human autonomic nervous system activity using pulsatile blood volume waveform signals, said apparatus comprising:

a photoplethysmographic probe having a light emitting element and an opposing light detecting element, and having an output signal indicating changes in blood volume on at least one alpha andrenergic receptor site of a human body;

a processor element, responsive to said output signal indicating changes in blood volume, for reducing said waveform signals to a slope value;

said processor element containing an algorithm for normalization of the slope value;

said processor element containing an artifact rejection algorithm for eliminating from further processing slope values less that one; and

amplifier and filter circuitry for rendering output signals representative of said slope values.

2. The apparatus of claim 1, wherein the photoplethysmographic probe is adapted for application on a finger.

3. The apparatus of claim 1, wherein the photoplethysmographic probe is adapted for indirect application to the alpha andrenergic receptor site, whereby no direct contact with a body part is required.

4. The apparatus of claim 1, further comprising a display for visual indication of output signals.

5. The apparatus of claim 3, further comprising a display for indicating information representative of pulsatile blood volume waveform signals.

6. The apparatus of claim 3, further comprising a display for indicating information representative of slope values.

7. The apparatus of claim 3, further comprising a display for indicating information representative of a slope ratio.

8. The apparatus of claim 1, further comprising an electronic storage medium for data storage capability.

9. The apparatus of claim 1, further comprising at least one data port for downloading output signals.

10. An apparatus for monitoring human autonomic nervous system activity using pulsatile blood volume waveform signals, said apparatus comprising:

a photoplethysmographic probe having a light emitting element and an opposing light detecting element, and having an output signal indicating changes in blood volume on at least one alpha andrenergic receptor site of a human body;

a power supply having a battery with capacity for at least 12 hours;

analog circuitry for power supply voltage regulation and conditioning;

an interface for an OEM supplied finger pulse oximetry probe;

a low frequency front-end filter for conditioning a probe input signal;

an input signal pre-amplifier stage;

a high frequency filter for conditioning probe input signal;

a gain-controlled signal amplifier stage;

a bar graph display for visual indication of a pulse signal;

a polygraph output port for pulse signal data;

a digital processing unit, such as a microprocessor or microcontroller, to provide slope detection and peak to peak height determination of each systolic finger pulse, mathematical normalization of input signal slope, digital to analog (D/A) conversion of the slope value for a polysomnographic display, and digital control of finger probe gain, and having a status indicator LED;

a plurality of user controls comprising on/off, start/stop and transmit functions;

a display for visual indication of slope ratio information;

a data storage unit, such as such as an on-board multi-media card, to permit at least 5 hours of data storage; and

a plurality of output ports for providing analog and digital output of the pulsatile waveform and a DC level representative of the normalized slope, and slope ratio data..

11. A method for identification of human autonomic nervous system activity, the method comprising the steps of:

disposing a photoplethysmographic probe proximate to a single alpha andrenergic receptor site of a human body part;

obtaining an electrical signal from said probe representative of pulsatile blood volume within said body part;

deriving a pulsatile blood volume waveform as a function of amplitude and time;

defining a time interval for calculation of a slope of the pulsatile blood volume waveform;

applying an algorithm that continuously provides real-time calculation of the slope along said waveform within said time interval;

dividing peak amplitude values by a time constant and eliminating slope values less than 1, whereby artifact elimination is achieved;

normalizing slope values; and

providing information representative of slope values, whereby autonomic nervous system activity is monitored.

12. The method of claim 11 further comprising the step of applying signal filtration means, whereby undesirable low and high frequency signal components are eliminated.

13. The method of claim 11 further comprising the step of monitoring the pulsatile

blood volume amplitude.

14. The method of claim 11 further comprising the step of amplifying and filtering slope values, whereby improved sensitivity and accuracy is achieved.

15. The method of claim 11 further comprising the step of providing an output display of visual information representative of slope values.

16. The method of claim 11 further comprising the step of providing data output representative of input data and slope values.

17. The method of claim 11 further comprising the step of providing a means for storing data representative of input data and slope values.